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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,407	01/23/2004	Shenggao Liu	005950-844	9511

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EXAMINER

HAMILTON, CYNTHIA

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 03/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/764,407

Applicant(s)

LIU ET AL.

Examiner

Cynthia Hamilton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01/23/04, 5/11/04, 10/15/04, 01/03/05.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-96 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-96 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-8, drawn to a polymerizable diamantyl monomer, classified in class 560, subclass 116.
 - II. Claims 9-16, drawn to a polymerizable triamantyl monomer, classified in class 560, subclass 116.
 - III. Claims 17-24, drawn to a polymerizable, diamondoid-containing monomer having the formula $Pg - D - (R)_n$, wherein D is a diamondoid nucleus selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane,, classified in class 560, subclass 116.
 - IV. Claims 25-26, drawn to a polymer, classified in class 526, subclass 281.
 - V. Claims 27-42, drawn to a method of forming a patterned layer and pattern made,, classified in class 430, subclass 326.
 - VI. Claims 43-83, drawn to a positive-working photoresist composition classified in class 430, subclass 270.1.
 - VII. Claims 84-93, drawn to a method of preparing hydroxylated diamantanes, classified in class 568, subclass 818.

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VIII. Claim 94, drawn to

94. A method of preparing diamantane methacrylate, the method comprising the step of:

- a) adding methacryloyl chloride to mono-hydroxylated diamantane and triethylamine to form a reaction mixture;
- b) adding an additional amount of methacryloyl chloride and 4-dimethylaminopyridine to the reaction mixture of step a); and
- c) recovering diamantane methacrylate from the reaction mixture of step b).

, classified in class 560, subclass 116.

IX. Claim 95, drawn to

95. A method of preparing mono-hydroxylated diamantane methacrylate, the method comprising the steps of:

- a) adding methacryloyl chloride to di-hydroxylated diamantane and triethylamine to form a reaction mixture; and
- b) recovering mono-hydroxylated diamantane methacrylate from the reaction mixture of step a).

, classified in class 560, subclass 116.

X. Claim 96, drawn to

96. A method of preparing mono-hydroxylated diamantane methacrylate, the method comprising the steps of:

- a) adding methacryloyl chloride to di-hydroxylated diamantane and methacrylic acid to form a reaction mixture;
- b) adding dicyclohexyl carbodiimide and 4-dimethylaminopyridine to the reaction mixture of step a); and
- c) recovering mono-hydroxylated diamantane methacrylate from the reaction mixture of step b).

, classified in class 560, subclass 116.

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The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions do not read on each other. The monomers covered are mutually exclusive because the Invention I is limited to diamantyl compounds while Invention II is limited to triamantyl compounds.

3. Inventions I and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions do not read on each other. The monomers covered are mutually exclusive because the Invention I is limited to diamantyl compounds while Invention III is limited to tetraadamanyl or higher compounds.

4. Inventions II and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions do not read on each other. The monomers covered are mutually exclusive because the Invention II is limited to triamantyl compounds while Invention III is limited to tetraadamanyl or higher compounds.

5. Inventions I and IV are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and

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the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as a monomer in a negative photoresist wherein a free radical initiator is added to cause polymerization through the polymerizable group to form the image and epoxides are added to crosslink through the hydrophilic groups present to harden the image and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

6. Inventions II and IV are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as a monomer in a negative photoresist wherein a free radical initiator is added to cause polymerization through the polymerizable group to form the image and epoxides are added to crosslink through the hydrophilic groups present to harden the image and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In

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either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

7. Inventions III and IV are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as a monomer in a negative photoresist wherein a free radical initiator is added to cause polymerization through the polymerizable group to form the image and epoxides are added to crosslink through the hydrophilic groups present to harden the image and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

8. Inventions I and IV are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the monomers of Groups II or III as well as monomers wherein the polymerizable group and hydrophilic-enhancing group are pendent off the same ring carbon as

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set forth in WANG et al (Journal of Polymer Science) in the compound of diamantylmaleamic acid can be used to make IV. The subcombination has separate utility such as the end capping of urethanes through hydrophilic groups thus leaving oligomers for further crosslinking.

9. Inventions II and IV are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the monomers of Groups I or III as well as monomers wherein the polymerizable group and hydrophilic-enhancing group are pendent off the same ring carbon as set forth in WANG et al (Journal of Polymer Science) in the compound of diamantylmaleamic acid can be used to make IV. The subcombination has separate utility such as the end capping of urethanes through hydrophilic groups thus leaving oligomers for further crosslinking.

10. Inventions III and IV are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the monomers of Groups I or II as well as monomers wherein the polymerizable group and hydrophilic-enhancing group are pendent off the same ring carbon as set forth in WANG et al (Journal of Polymer Science) in the compound of diamantylmaleamic acid can be

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used to make IV. The subcombination has separate utility such as the end capping of urethanes through hydrophilic groups thus leaving oligomers for further crosslinking.

11. Inventions IV and VI are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the photoresist composition of Group IV is not limited to the polymer of Group IV in that a hydrophilic-enhancing moiety is not required to be present as evidenced by R₂ and R₃ being H as one choice. The subcombination has separate utility such as a monomer in a negative photoresist wherein a free radical initiator is added to cause polymerization through the polymerizable group to form the image and epoxides are added to crosslink through the hydrophilic groups present to harden the image.

12. Inventions I and X are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product must be made in a different manner if other manner if a carboxylic group is the hydrophilic enhancing moiety for R. The method of Invention X makes only one species of the Genus of group I.

13. Inventions VIII and I are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different

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functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions the product of method VIII does not produce the monomer of Group I because there is no hydrophilic enhancing moiety present.

14. Inventions II/III and VII/VIII/IX/X are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions VII/VIII/IX/X are all related to methods of making diamantane compounds. Inventions II/III are exclusive of diamantane compounds.

15. Inventions VII and VIII are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions the methods make different compounds.

16. Inventions VIII and IX are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions the methods make different compounds.

17. Inventions IX and X are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions the methods have different modes of operation as evidenced by the use of triethylamine in the process of IX but not X and the use of dicyclohexyl carbodiimide and 4-

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dimethylaminopyridine in the process of X. The end product is the same but the method of making is different.

18. The examiner notes for the record that claim 72 appears incomplete. In its present form, any positive-acting photoresist with a base resin would read on claimed photoresist.

19. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

20. Because these inventions are distinct for the reasons given above and the search required for any one Group is not required for the other Groups, restriction for examination purposes as indicated is proper.

21. Due to the complexity of this restriction requirement, no attempt was made at a provisional election via telephone.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

22. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Hamilton whose telephone number is 571-272-1331.

The examiner can normally be reached on Monday through Friday 9:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H Kelly can be reached on (571) 272-0729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Cynthia Hamilton
Primary Examiner
Art Unit 1752

March 13, 2005

**CYNTHIA HAMILTON
PRIMARY EXAMINER**